V. Alternatives

This section describes the alternatives analysis conducted to accommodate the projected facility requirements. The assessment of alternatives began with the airfield alternatives analysis and subsequent selection of a preferred airfield layout able to meet the projected unconstrained activity demands of the Airport. Selection of a preferred airfield layout permitted the identification of airfield areas available for terminal and other facility development. The combination of available development areas plus the demand for aircraft gates supported the assessment of terminal development alternatives. Similarly, considering relocation needs, future facility requirements, and available areas, development concepts for support/ancillary facilities were explored. Finally, based on the preferred airfield, terminal, and support/ancillary development layouts, ground access concepts supporting these various components were developed.

The comprehensive program encompasses the preferred alternative of each of the main facility types. The program is detailed in Section VI, *Preferred Development Plan.*

5.1 Airfield Alternatives Analysis

Over the past 15 years, the City of Chicago has undertaken a number of studies aimed at identifying solutions to the increasing delay problem at O'Hare. These studies, which have included the 1991 and 2002 Delay Task Force Studies and internal studies conducted by DOA in the mid 1990s, have investigated opportunities for runway development to mitigate escalating delays. Concepts studied in these efforts have included the following:

- *South Runway 9S-27S*: Development of an independent runway in the 9-27 orientation south of existing Runway 9R-27L.
- *North Runway 9N-27N*: Development of an independent runway in the 9-27 orientation north of existing Runway 9L-27R.
- *South Runway 14S-32S*: Development of an independent runway in the 14-32 orientation southwest of existing Runway 14R-32L.
- *South Runway 9S-27S and South Runway 14S-32S*: Development of an independent runway in the 9-27 orientation south of existing Runway 9R-27L and in the 14-32 orientation southwest of existing Runway 14R-32L.
- *North Runway 9N-27N and South Runway 14S-32S*: Development of an independent runway in the 9-27 orientation north of existing Runway 9L-27R and in the 14-32 orientation southwest of existing Runway 14R-32L.
- *North Runway 9N-27N and South Runway 9S-27S*: Development of independent runways in the 9-27 orientation north of existing Runway 9L-27R and south of existing Runway 9R-27L.

While these studies concluded that several options were available to mitigate airfield delays, none of the options provided long-term capacity growth consistent with potential needs. However, through these efforts, it was generally determined that development of a North Runway 9N-27N provided the best option (primarily measured by relative ease of implementation) for addressing the immediate need for additional IFR arrival capacity to mitigate IFR arrival delay.

In early 2002, the City initiated a series of meetings (advisory sessions) with the FAA and airlines to identify and assess airfield development alternatives to address existing delays and provide for long-term growth at O'Hare. As part of the initial advisory session held with these parties, the City presented a number of airfield concepts for consideration and comment. These concepts were subsequently refined and modified to provide the basis for the Master Plan. The following sections present the initial concepts, the alternatives identified for consideration, and the ultimately selected concept for airfield development.

5.1.1 Initial Airfield Concepts

Initial airfield concepts were developed by the City and its consultant for presentation to the FAA and airlines in the initial advisory session. The purpose of these concepts was primarily to generate discussion by the group relative to various approaches to increasing capacity. Ultimately, the intent was to define a limited number of concepts for more detailed study including simulation modeling if deemed appropriate. **Exhibits V-1** through **V-4** present Initial Concepts 1 through 4, respectively. The following sections discuss the initial concepts and comments received in the advisory session relative to their characteristics.

Initial Concept 1: Initial Concept 1 includes the existing airfield layout (with the exception of Runway 18-36) and a new far south runway that was added to provide a third arrival stream during IFR conditions. Additionally, this alternative includes an extension to existing Runways 14L-32R and 9R-27L in order to provide additional departure field length, as well as shortening of existing Runways 14L-32R and 14R-32L at the 32 end to eliminate runway intersections.

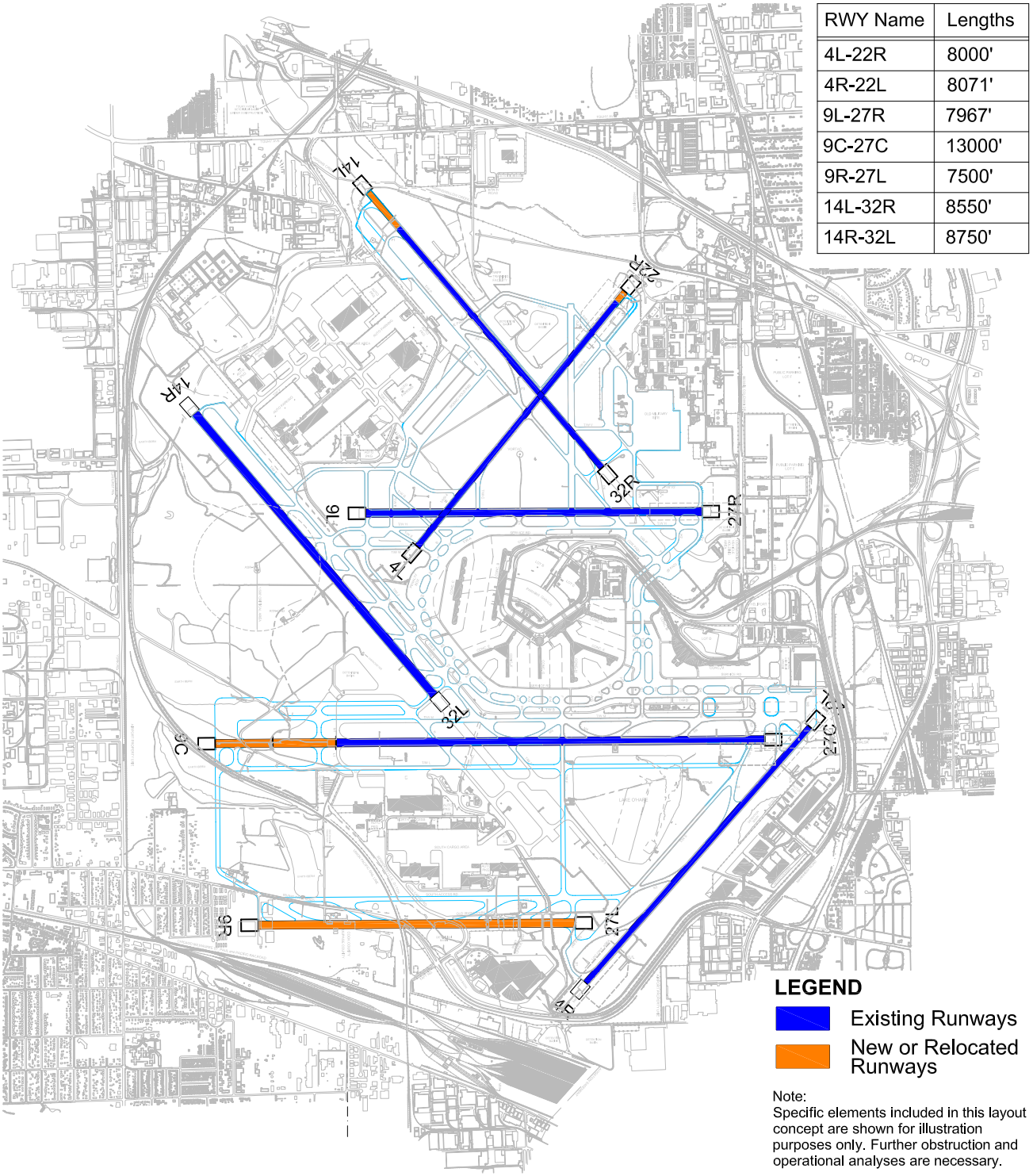
Input on Initial Concept 1 focused on the need to add additional departure capacity to balance with the additional arrival capacity provided for by the new south runway. It was determined that a closely-spaced runway south of existing Runway 9R-27L, with a perimeter taxiway around the west end of this runway, would best provide this additional departure capacity. The group also determined that the independent arrival runway would be better placed on the north side of the airfield due to likelihood that it would be easier to construct in this location than on the southern side.

Initial Concept 2: Initial Concept 2 includes maintaining existing Runways 9L-27R, 9R-27L, 4L-22R, and 4R-22L; constructing new far-spaced independent runways on the north and south airfields, and constructing new closely-spaced runways north and south of Runways 9L-27R and 9R-27L, respectively. Additionally, this concept includes extensions to existing Runways 9L-27R, 9R-27L, and 4L-22R to provide additional departure field length.

Comments on Option 2 focused on optimizing departure gaps and maximizing available landing distance under LAHSO procedures. This resulted in the removal of the extensions to existing Runways 9L-27R and 4L-22R and the addition of an extension to the proposed closely-spaced north runway. These comments also resulted in the development of a new alternative, referred to as "Option 2A," that relocated existing Runway 4L-22R instead of removing the extension to existing Runway 9L-27R. Option 2A was subsequently dropped from consideration due to the impacts of the relocated 4L approach on the available area for western terminal development.

Initial Concept 3: Initial Concept 3 consists of an airfield layout composed of existing Runways 9R-27L, 4L-22R, and 4R-22L, the relocation of existing Runway 9L-27R to the north to provide room for an additional taxiway on the north side of the existing terminal core area, construction of new far-

RWY Name	Lengths
4L-22R	8000'
4R-22L	8071'
9L-27R	7967'
9C-27C	13000'
9R-27L	7500'
14L-32R	8550'
14R-32L	8750'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

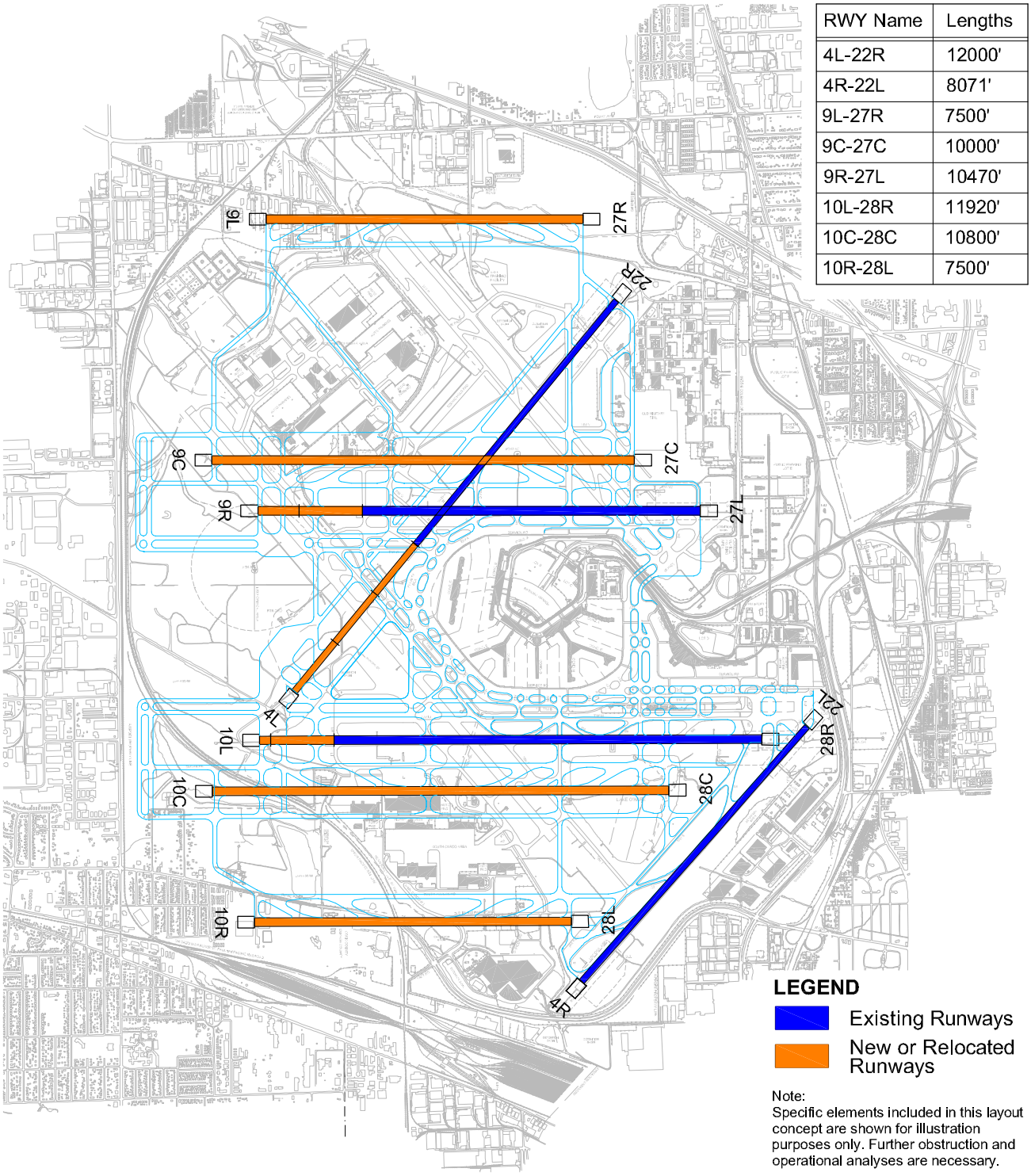
Exhibit V-1

0 3600 ft.

north

Initial Airfield Concept 1

RWY Name	Lengths
4L-22R	12000'
4R-22L	8071'
9L-27R	7500'
9C-27C	10000'
9R-27L	10470'
10L-28R	11920'
10C-28C	10800'
10R-28L	7500'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

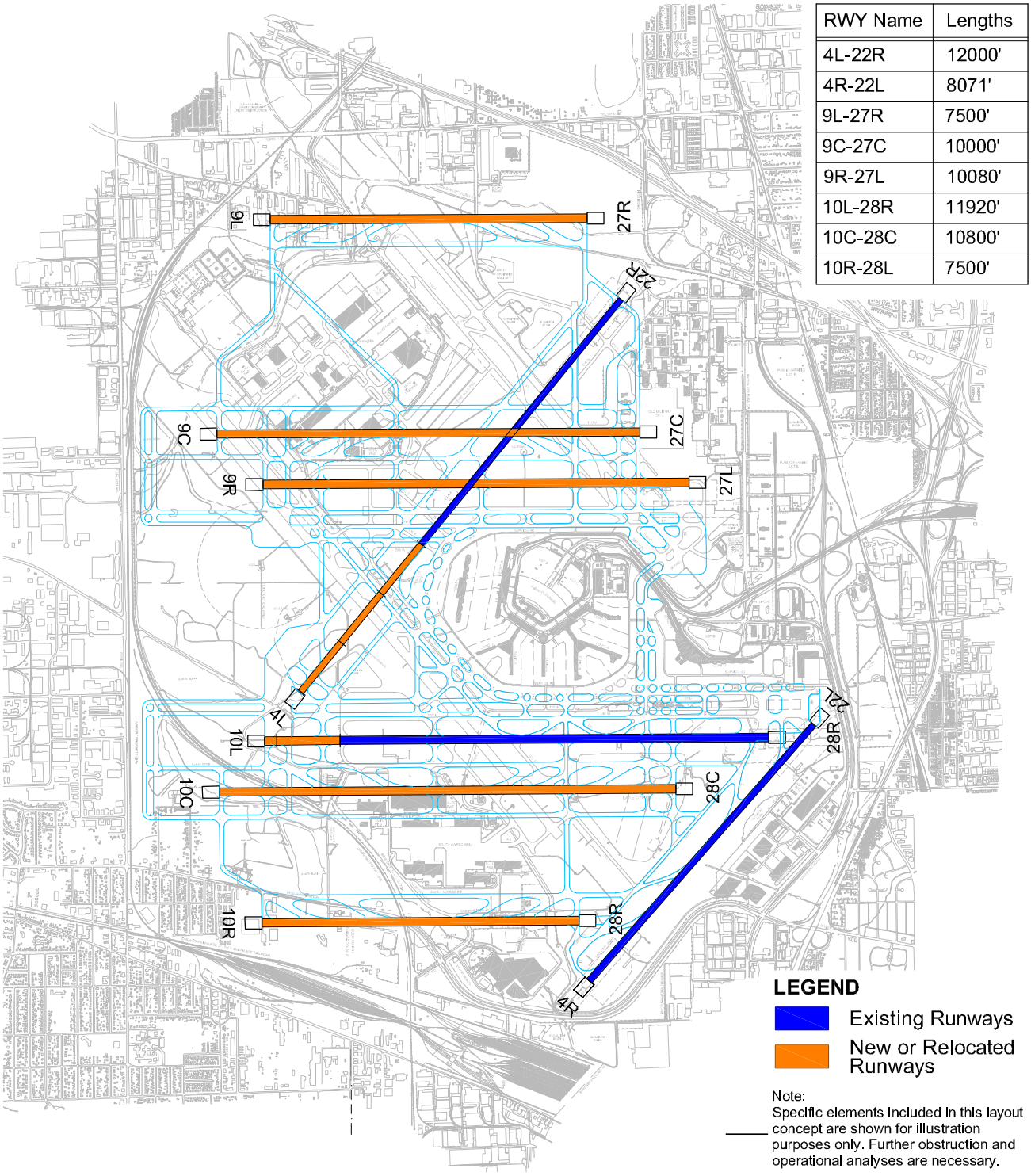
Exhibit V-2

0 3600 ft.

north

Initial Airfield Concept 2

RWY Name	Lengths
4L-22R	12000'
4R-22L	8071'
9L-27R	7500'
9C-27C	10000'
9R-27L	10080'
10L-28R	11920'
10C-28C	10800'
10R-28L	7500'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

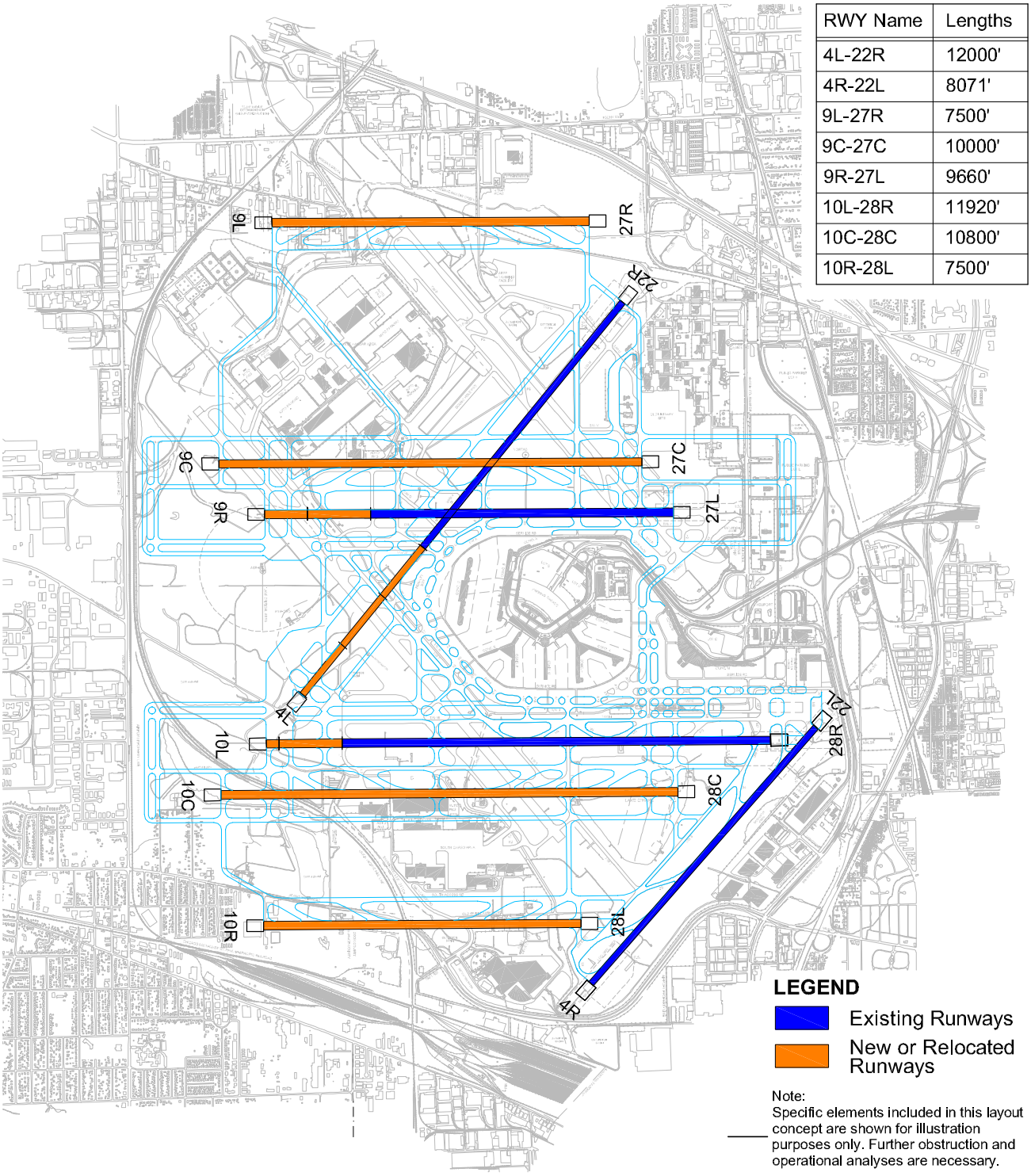
Exhibit V-3

0 3600 ft.

north

Initial Airfield Concept 3

RWY Name	Lengths
4L-22R	12000'
4R-22L	8071'
9L-27R	7500'
9C-27C	10000'
9R-27L	9660'
10L-28R	11920'
10C-28C	10800'
10R-28L	7500'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records
Prepared by: Ricondo & Associates, Inc.

Exhibit V-4

0 3600 ft.

north

Initial Airfield Concept 4

spaced independent runways on the north and south airfields, and construction of new closely-spaced runways north and south of Runways 9L-27R and 9R-27L, respectively. This option also includes extensions to existing Runways 4L-22R and 9R-27L.

Comments on Initial Concept 3 were similar to those provided on Initial Concept 2. This resulted in the relocation of existing Runway 4L-22R in order to provide additional landing distance under LAHSO and a reduction in the lengths of Runway 4L-22R and the relocated existing Runway 9L-27R in order to reduce the departure gap. An extension to the new closely-spaced north runway was also suggested.

Initial Concept 4: Initial Concept 4 is similar to initial Concept 2 with the addition of end-around taxiways on both the west and east ends of the closely-spaced parallel runway sets on the north and south airfields. Option 4 also initially included an extension to the existing Runway 4L-22R.

Comments on Initial Concept 4 focused on maximizing landing distance available under LAHSO and minimizing the departure gap. This resulted in the removal of the extension to Runway 4L-22R and the relocation of this runway to the northwest, a reduction to the extension to existing Runway 9L-22R, and an extension to the closely-spaced north runway.

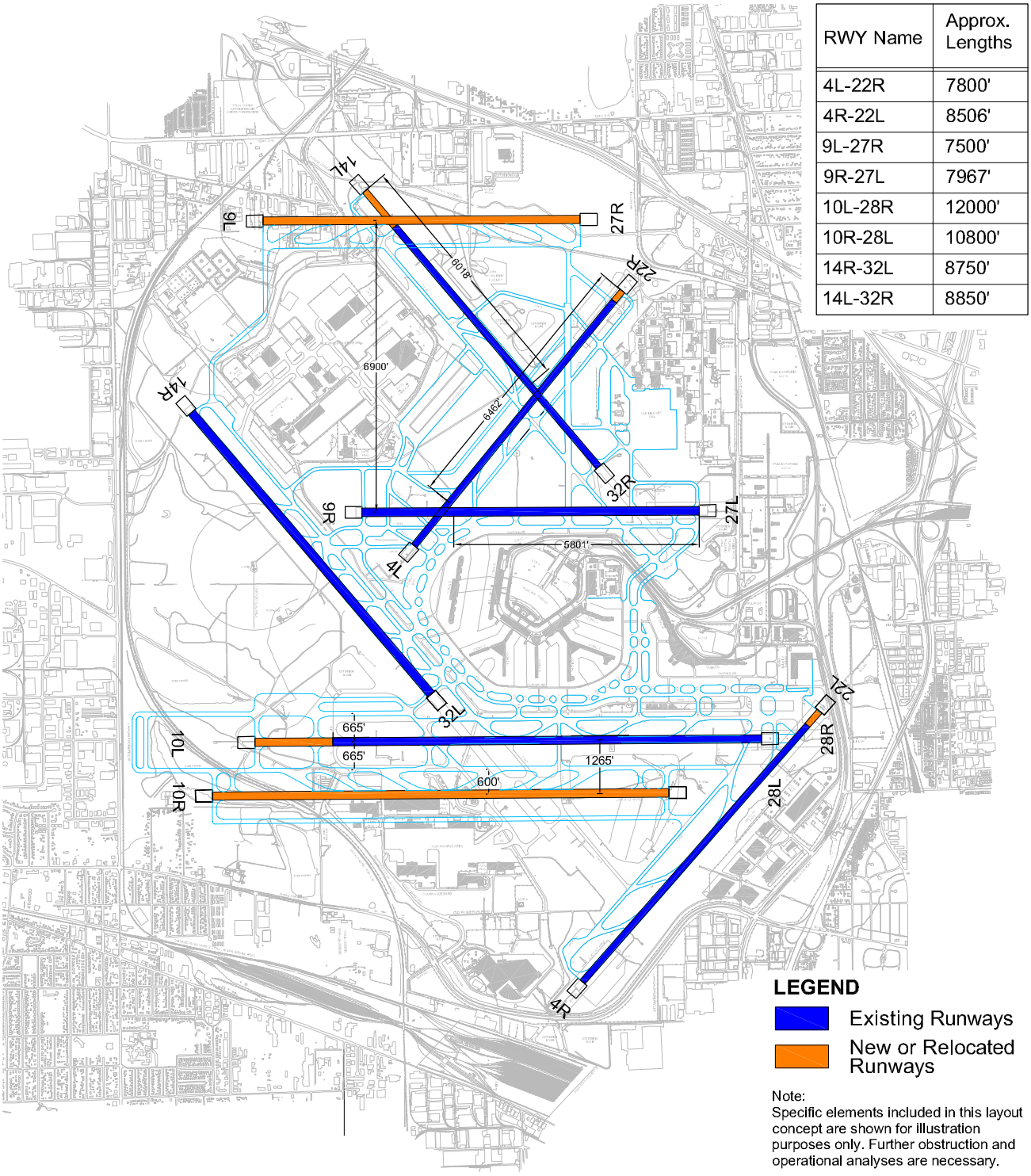
Following the initial advisory session, the City undertook an evaluation of the refined initial concepts along with the concept originally proposed by the City in June 2001. Utilizing the advisory session format, the City continued to elicit comments and ideas from the FAA and airlines on how to best address the need to reduce delays and accommodate growth at the Airport. Concepts were continuously refined and this resulted in five airfield options. Following extensive analysis and reviews, a preferred airfield alternative, known as Option 5, was selected for refinement as the preferred airfield concept. The following sections discuss the 5 options and the alternatives analysis.

5.1.1.1 Option 1 Characteristics

Option 1, depicted in **Exhibit V-5**, is an eight-runway configuration that accommodates triple arrivals during all-weather conditions. The primary objectives of the Option 1 airfield layout are to reduce existing IFR delay, increase existing VFR capacity, reduce runway intersections and runway crossings where practicable, and provide accommodations for future ADG VI aircraft.

The characteristics of Option 1 include the addition of a two new runways parallel to existing runways oriented to take full advantage of wind coverage and existing IFR runway pairs. Based on weather data and existing layout, a 9-27 orientation was determined to best meet this criteria. Future Runway 9L-27R would provide a third parallel arrival stream necessary to reduce existing IFR delays. Additionally, a new Runway 10R-28L is provided primarily as a departure runway used to increase IFR capability and to maintain a balanced arrival/departure mix during IFR. Runway 14R-32L is shortened to eliminate the runway intersection with Existing Runway 9R-27L and Future Runway 10R-28L. With the reduction in length of Runway 14R-32L, currently the longest runway, existing Runway 9R-27L (Future Runway 10L-28R) is lengthened to provide sufficient departure runway length for long-haul markets. Perimeter taxiways are provided where possible to reduce the number of runway crossings. All other existing runway lengths are adjusted where practicable to provide greater airfield efficiencies.

Following is a list of characteristics of Option 1:



RWY Name	Approx. Lengths
4L-22R	7800'
4R-22L	8506'
9L-27R	7500'
9R-27L	7967'
10L-28R	12000'
10R-28L	10800'
14R-32L	8750'
14L-32R	8850'

Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

Exhibit V-5

0 3600 ft.

north

Option 1

- New Runway 9L-27R, constructed 6,900 feet north of Future Runway 9R-27L (formerly Runway 9L-27R), is 200 feet wide and 7,500 feet long. A full length, 100-foot wide parallel taxiway is provided at a 600-foot centerline separation. Connecting and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runway 9L-27R (Future Runway 9R-27L) remains unmodified.
- Existing Runway 9R-27L (Future Runway 10L-28R) is extended 1,859 feet to a new length of 12,000 feet. As a result of the shortening of Runway 14R-32L, the extended Runway 9R-27L becomes the longest runway at the Airport. Its length, however, is 1,000 feet shorter than the existing longest runway, due to the need to protect for operations on the perimeter taxiway in this alternative. The Runway 9R-27L parallel taxiway to the north is partially relocated to a centerline separation of 665 feet along the western end of the runway and is extended to a set of connecting taxiways beginning approximately 2,575 feet beyond the threshold. These link the north parallel taxiway with the parallel taxiway to Future Runway 10C-28C, also at a separation of 665 feet from 10L-28R, to create a perimeter taxiway around Runway 10L. Additional connecting, bypass, and high-speed exit taxiways appropriate to the new runway length and expected operating patterns are provided. The runway extension and associated taxiways meet ADG V standards. The perimeter taxiways meet ADG VI standards and are designed at runway-to-taxiway separations that keep taxiing ADG V aircraft clear of TERPS approach surfaces.
- Existing Runway 18-36 is relocated to Future Runway 10R-28L, 1,265 feet south of Runway 10L-28R (formerly Runway 9R-27L). The runway is 10,800 feet long and 200 feet wide and is served by a full length, 100-foot wide parallel taxiway at a 600-foot centerline separation. Connecting, bypass, and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runway 14L-32R is shortened on its southeast end, to remove the intersection with Runway 10L-28R (formerly Runway 9R-27L), and is extended on its northwest end to provide an operational length of 8,850 feet. The runway and associated taxiways maintain ADG V standards.
- Existing Runway 14R-32L is shortened on its southeast end, to an operational length of 8,750 feet, to remove the intersection with Runway 10L-28R (formerly Runway 9R-27L). The runway and associated taxiways maintain ADG V standards.
- Existing Runway 4L-22R is extended to improve Runway 4L take-off performance and enhance Runway 22R LAHSO capabilities.
- Existing Runway 4R-22L is extended on its northeast end to an overall length of 8,506 feet, which will allow a B-767-300 or smaller aircraft to position and hold on the runway for a Runway 22L departure with an arrival in process on Runway 28R. Connecting and bypass taxiways are provided. The runway extension and associated taxiways meet ADG V standards.
- Three of the four parallel runways in the 9-27 (10-28) orientation, at runway-to-runway centerline separations of 6,900 feet and 5,416 feet, exceed the recommended 2,500-foot separation for triple simultaneous VFR approaches.

- Three of the four parallel runways in the 9-27 (10-28) orientation, at runway-to-runway centerline separations of 6,900 feet and 5,416 feet, exceed the recommended 5,000-foot separation for triple simultaneous IFR approaches.

Exhibit V-6 illustrates estimated typical runway operating configurations associated with Option 1 under both VFR and IFR conditions and east and west operating flow patterns.

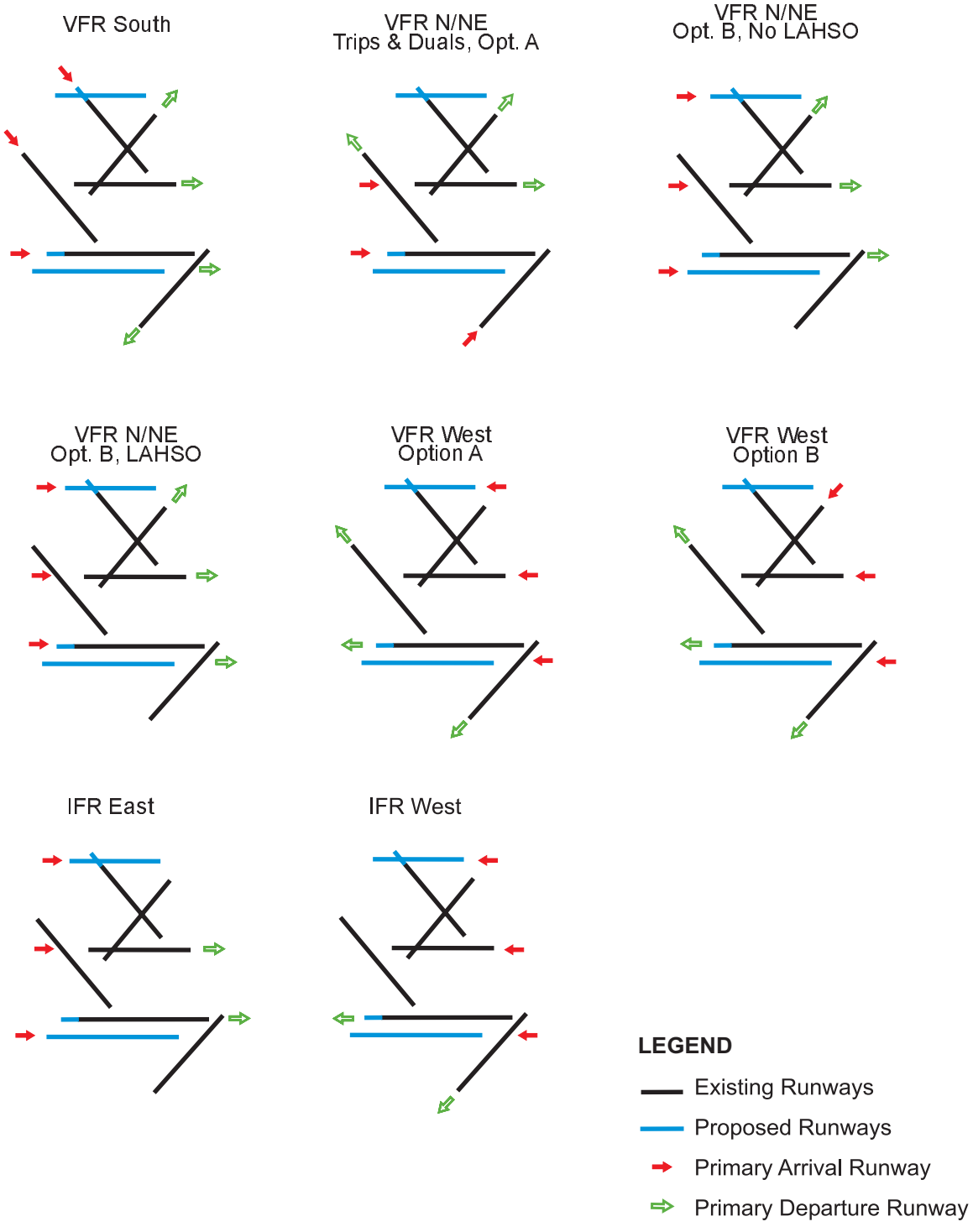
5.1.1.2 Option 2 Characteristics

Option 2, depicted in **Exhibit V-7**, is an eight-runway configuration that includes six parallel runways in an east-west direction and two crosswind runways in the 4-22 orientation. The primary objectives of the Option 2 airfield layout are to reduce existing IFR delays, increase both IFR and VFR capacity to satisfy future demand, maintain balanced arrival/departure throughput capability, reduce runway intersections and runway crossings where practicable, and provide accommodations for future ADG VI aircraft.

The characteristics of Option 2 include the addition of four new runways parallel to one of the existing runway pairs oriented to take full advantage of wind coverage in all weather conditions. Based on weather data and existing layout, a 9-27 orientation was determined to meet this criteria. With the addition of these runways, it was necessary to relocate/decommission Runways 14R-32L and 14L-32R to eliminate runway intersections. This, in addition to providing perimeter taxiways, could reduce the number of runway crossings. With the reduction in length of Runway 14R-32L (currently the longest runway), existing Runway 9R-27L (Future Runway 10L-28R) was lengthened to provide sufficient departure runway length for long-haul markets. This layout could provide a balanced VFR or IFR arrival/departure capability by utilizing three dedicated arrival runways and three dedicated departure runways during IFR. With FAA approval, this concept could produce a fourth arrival stream during certain VMC conditions.

Following is a list of characteristics of Option 2:

- New Runway 9L-27R, constructed 6,900 feet north of Runway 9R-27L (formerly Runway 9L-27R), is 200 feet wide and 7,500 feet long. A full length, 100-foot wide parallel taxiway is provided at a 600-foot centerline separation. Connecting and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runway 14L-32R is relocated to Future Runway 9C-27C, 1,265 feet north of Runway 9R-27L (formerly Runway 9L-27R). The spacing between Runway 9C-27C and future Runway 9R-27L is established to accommodate 665 feet of separation between Runway 9R-27L and its north parallel taxiway so that taxiing aircraft proceeding around the west approach end do not penetrate the TERPS approach surface. The runway is 200 feet wide and 11,237 feet long and is served by 100-foot wide parallel taxiways to the north and south, both at 600-foot runway-to-taxiway centerline separations. Connecting, bypass, and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runway 9L-27R (future Runway 9R-27L) remains unmodified to accommodate a perimeter taxiway around its west end. The associated parallel taxiway to the south is partially relocated to a centerline separation of 665 feet along the western end of the runway and is extended to a set of connecting taxiways beginning approximately 3,180 feet beyond



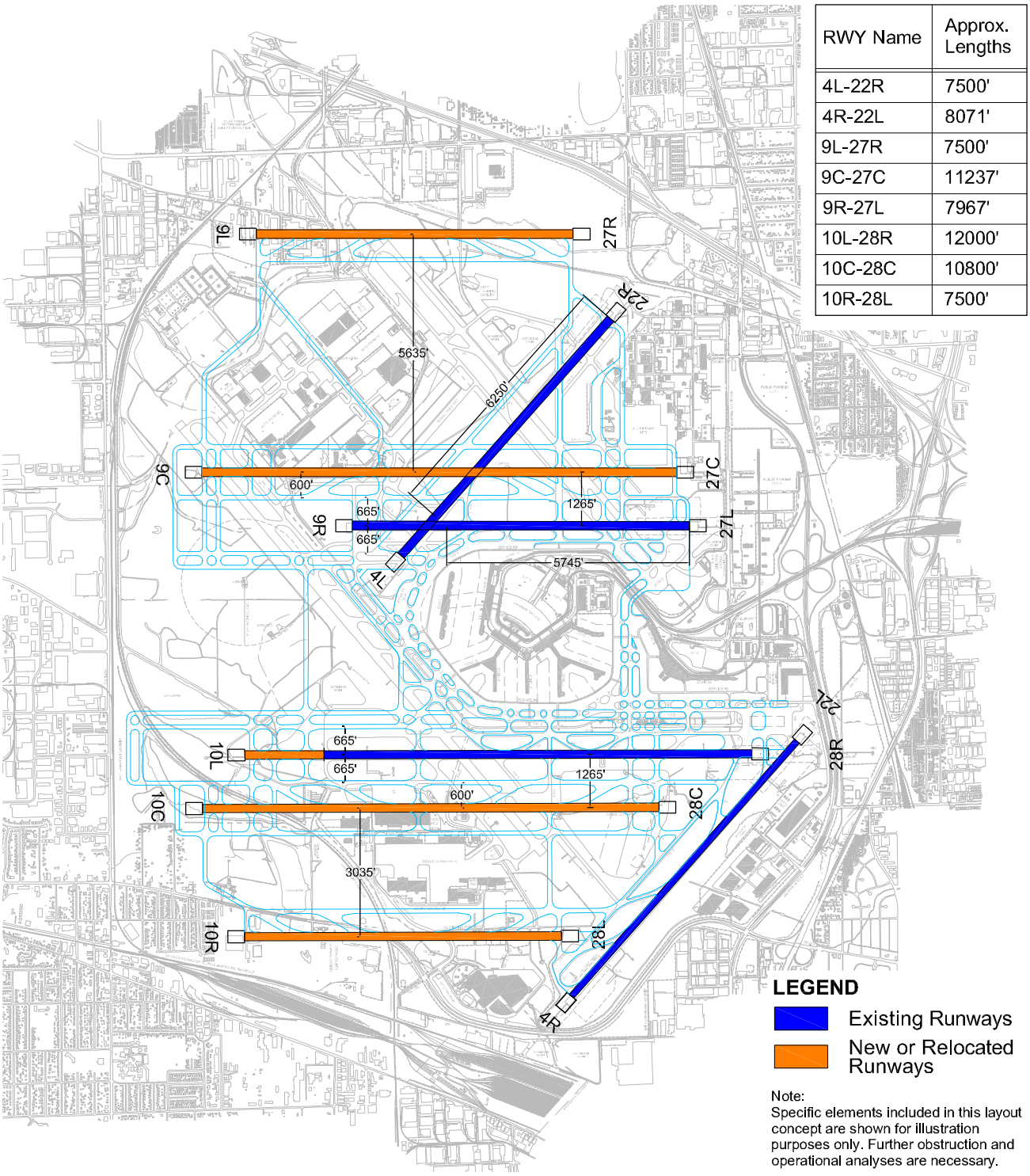
Sources: O'Hare Air Traffic Workgroup
Prepared by: Ricondo & Associates, Inc.

Exhibit V-6

0 N.T.S.

north

Operating Configurations Option 1



RWY Name	Approx. Lengths
4L-22R	7500'
4R-22L	8071'
9L-27R	7500'
9C-27C	11237'
9R-27L	7967'
10L-28R	12000'
10C-28C	10800'
10R-28L	7500'

Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

Exhibit V-7

0 3600 ft.

north

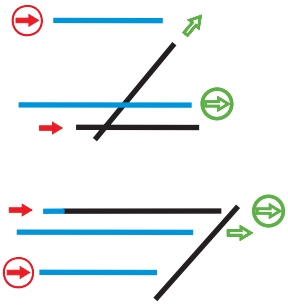
Option 2

the threshold. These link the south parallel with the parallel taxiway to Future Runway 9C-27C, also at separation of 665 feet from Runway 9R-27L, to create a perimeter taxiway around Runway 9R. The perimeter taxiways meet ADG VI standards and are designed at runway-to-taxiway separations that keep taxiing ADG V aircraft clear of TERPS approach surfaces.

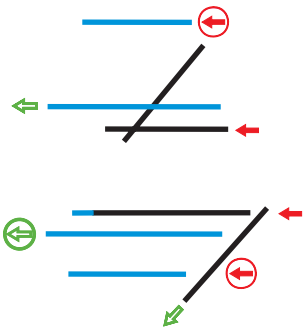
- Existing Runway 9R-27L (future Runway 10L-28R) is extended 1,859 feet to a new length of 12,000 feet. With the closure of the 13,000-foot Runway 14R-32L, this runway becomes the longest at the Airport. Its length, however, is 1,000 feet shorter than the existing longest runway, due to the need to protect for operations on the perimeter taxiway in this alternative. The associated parallel taxiway to the north is partially relocated to a centerline separation of 665 feet along the western end of the runway and is extended to a set of connecting taxiways beginning approximately 2,575 feet beyond the threshold. These link the north parallel with the parallel taxiway to Future Runway 10C-28C, also at separation of 665 feet from Runway 10L-28R, to create a perimeter taxiway around Runway 10L. Additional connecting, bypass, and high-speed exit taxiways appropriate to the new runway length and expected operating patterns are provided. The runway extension and associated taxiways meet ADG V standards. The perimeter taxiways meet ADG VI standards and are designed at runway-to-taxiway separations that keep taxiing ADG V aircraft clear of TERPS approach surfaces.
- Existing Runway 18-36 is relocated to Future Runway 10C-28C, 1,265 feet south of Runway 10L-28R (formerly Runway 9R-27L). The spacing between Runway 10C-28C and future Runway 10L-28R is established to accommodate 665 feet of separation between Runway 10L-28R and its south parallel taxiway so that taxiing aircraft proceeding around the west approach end do not penetrate the TERPS approach surface. The runway is 10,800 feet long and 200 feet wide and is served by full length, 100-foot wide parallel taxiways to the north and south, both at 600-foot runway-to-taxiway centerline separations. Connecting, bypass, and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runway 14R-32L is relocated to future Runway 10R-28L, 4,300 feet south of Runway 10L-28R (formerly Runway 9R-27L). The runway is 7,500 feet long and 200 feet wide and is served by a full length, 100-foot wide parallel taxiway to the north at a 600-foot centerline separation. Connecting and high-speed exit taxiways are provided as appropriate for the runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Existing Runways 4R-22L and 4L-22R remain unmodified.
- Certain combinations of four of the six runways in the 9-27 (10-28) orientation, at runway-to-runway centerline separations ranging from 3,035 feet to 7,946 feet, exceed the recommended separation of 2,500-foot for quadruple simultaneous VFR approaches.
- Certain combinations of three of the six parallel runways in the 9-27 (10-28) orientation, at runway-to-runway centerline separations ranging from 4,300 feet to 12,316 feet, meet or exceed the minimum 4,300-foot separation requirement for triple simultaneous IFR approaches.

Exhibit V-8 illustrates estimated typical runway operating configurations associated with Option 2 under both VFR and IFR conditions and east and west operating flow patterns.

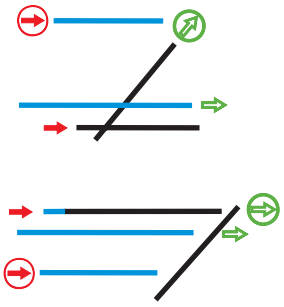
VFR East



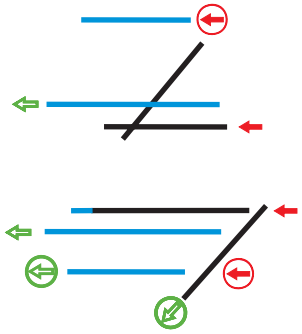
VFR West



IFR East



IFR West



LEGEND

- Existing Runways
- Proposed Runways
- Primary Arrival Runway
- Primary Departure Runway
- Overflow Arrival Runway
- Overflow Departure Runway

Sources: O'Hare Air Traffic Workgroup
Prepared by: Ricondo & Associates, Inc.

Exhibit V-8

0 N.T.S.

north

Operating Configurations Option 2

5.1.1.3 Option 3 Characteristics

Option 3, depicted in **Exhibit V-9**, is an eight-runway configuration that includes six parallel runways in an east-west direction and two crosswind runways in the 4-22 orientation. The primary objectives of the Option 3 airfield layout are to reduce existing IFR delays, increase both IFR and VFR capacity to satisfy future demand, maintain balanced arrival/departure throughput capability, reduce runway intersections and runway crossings where practicable, and provide accommodations for future ADGVI aircraft. Additionally, this concept would provide for dual-flow taxi capability around the entire Terminal Core Area.

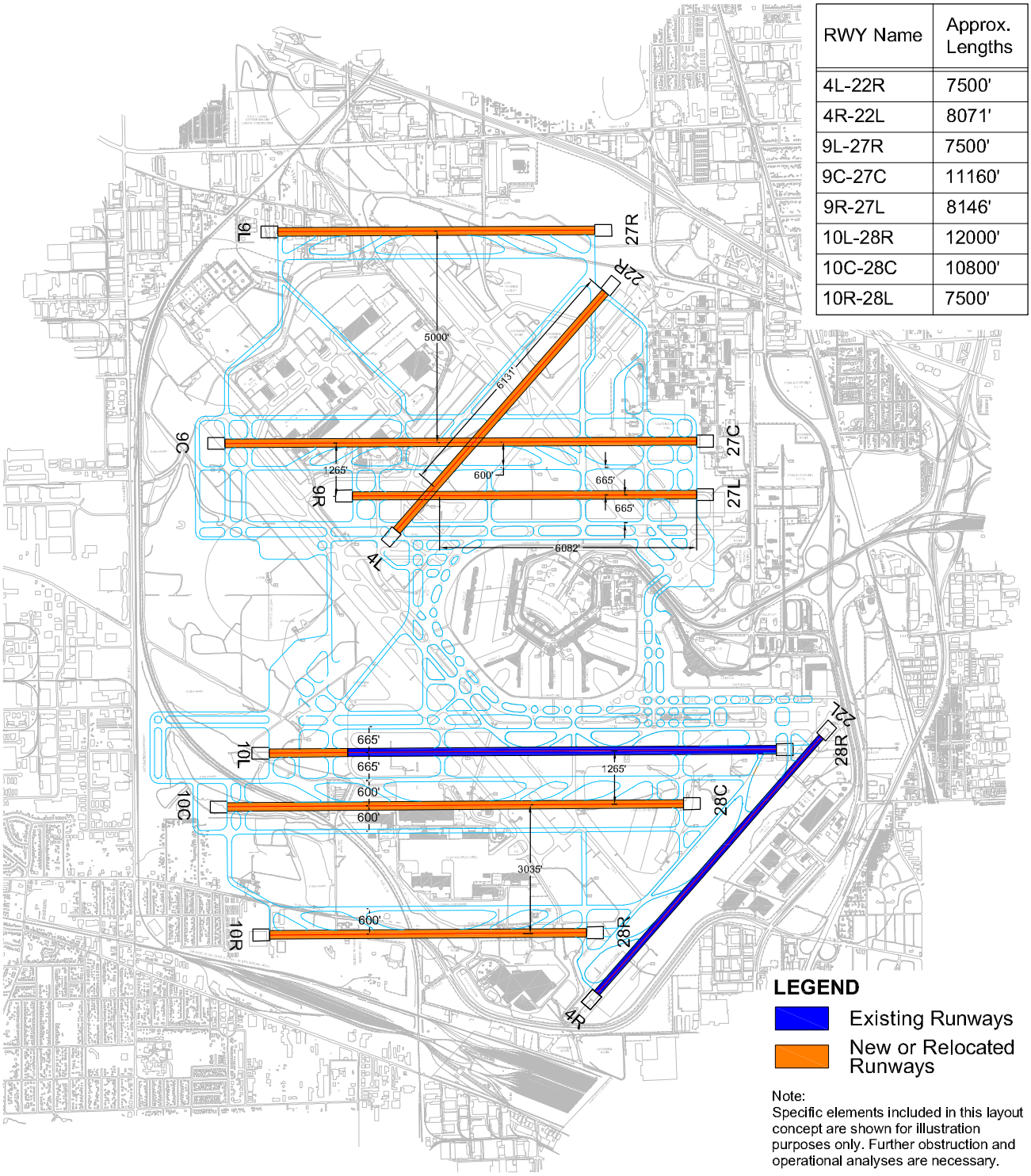
The primary difference between the Option 2 and Option 3 concept is the addition of a dual taxiway system around the north side of the Terminal Core Area. This new taxiway would require existing Runway 9L-27R to be relocated north of its existing location. Due to the relocation of existing Runway 9L-27R, Runway 4L-22R would need to be relocated northwest to maintain LASHO capabilities.

Characteristics of Option 3 are similar to those for Option 2 with the following exceptions:

- Future Runways 9C-27C and 9R-27L (formerly Runway 9L-27R) are relocated northward to accommodate dual parallel taxiways on the north side of the existing terminal area. Future Runway 9R-27L is 200 feet wide, per ADG VI standards, and is separated 665 feet from the full-length parallel taxiways to the north and south to accommodate perimeter taxiways around Runway 9R and avoid TERPS penetrations. Runway 9C-27C is provided at the maximum length possible while maintaining the 27C RSA clear of objects, and the 50:1 approach surface for Runway 9C over Airport property up to 35 feet. Similarly, the relocated Runway 9R-27L is shifted west to provide a full RSA at the Runway 27L end.
- Runway 4L-22R is relocated westward to maintain the existing LAHSO capability from Runway 9R-27L (formerly Runway 9L-27R). The relocated runway is 200 feet wide and is served by a 100-foot wide partial parallel taxiway at a 600-foot separation. Connecting and exit taxiways are provided as appropriate for runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Similar to Option 2, Option 3 includes the development of Runway 10R-28L, Runway 10C-28C, and the extension of existing Runway 9R-27L (future Runway 10L-28R). With the closure of the 13,000-foot Runway 14R-32L, Runway 10L-28R becomes the longest runway at the Airport at 12,000 feet. Its length, however, is 1,000 feet shorter than the existing longest runway, due to the need to protect for operations on the perimeter taxiway in this alternative.
- Certain combinations of four of the six runways in the 9-27 (10-28) orientation, at runway-to-runway centerline separations ranging from 3,035 feet to 7,346 feet, exceed the recommended separation of 2,500-foot for quadruple simultaneous VFR approaches.
- Certain combinations of three of the six parallel runways in the 9-27 (10-28) orientation, at separations ranging from 4,300 feet to 12,346 feet, meet or exceed the minimum 4,300-foot separation requirement for triple simultaneous IFR approaches.

Exhibit V-10 illustrates estimated typical runway operating configurations associated with Option 3 under both VFR and IFR conditions and east and west operating flow patterns.

RWY Name	Approx. Lengths
4L-22R	7500'
4R-22L	8071'
9L-27R	7500'
9C-27C	11160'
9R-27L	8146'
10L-28R	12000'
10C-28C	10800'
10R-28L	7500'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

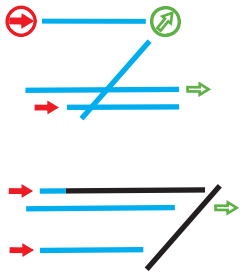
Exhibit V-9

0 3600 ft.

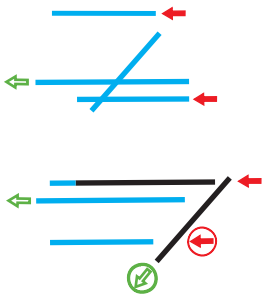
north

Option 3

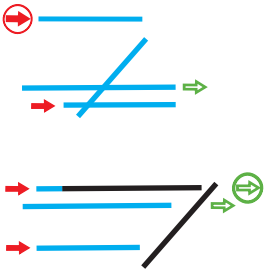
VFR East



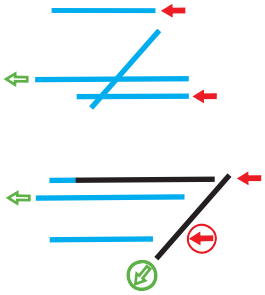
VFR West



IFR East



IFR West



LEGEND

- Existing Runways
- Proposed Runways
- Primary Arrival Runway
- Primary Departure Runway
- Overflow Arrival Runway
- Overflow Departure Runway

Sources: O'Hare Air Traffic Workgroup
Prepared by: Ricondo & Associates, Inc.

Exhibit V-10

0 N.T.S.

north

Operating Configurations Option 3

5.1.1.4 Option 4 Characteristics

Option 4, depicted in **Exhibit V-11**, is an eight-runway configuration that includes six parallel runways in an east-west direction and two crosswind runways in the 4-22 orientation. The primary objectives of the Option 4 airfield layout are to reduce existing IFR delays, increase both IFR and VFR capacity to satisfy future demand, maintain balanced arrival/departure throughput capability, reduce runway intersections and runway crossings where practicable, and provide accommodations for future ADG VI aircraft.

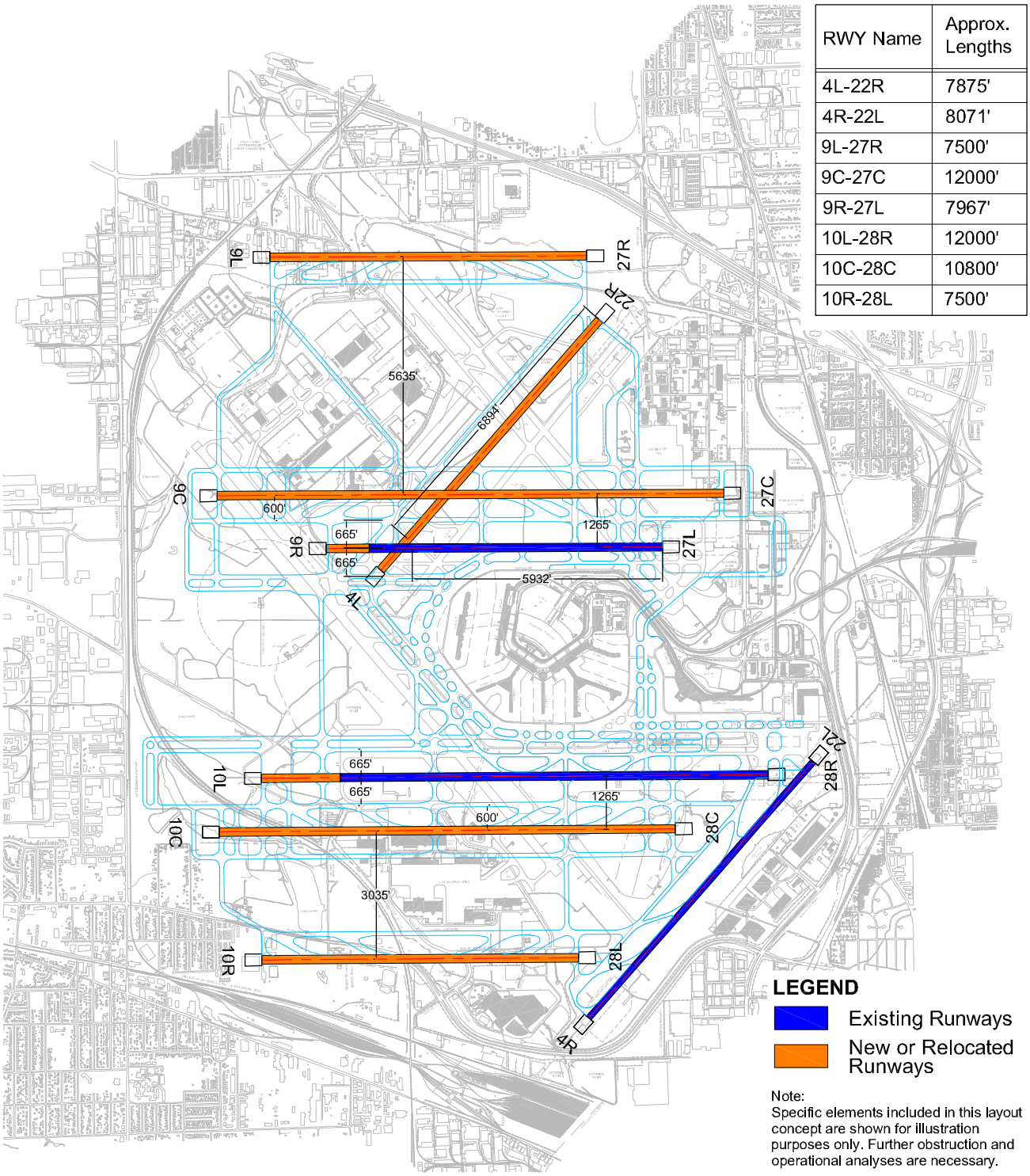
The primary difference between the Option 2 and Option 4 is that the Option 4 provides perimeter taxiways around the future Runway 27L end, necessitating the shifting of Runway 9R-27L to the west and relocation of Runway 4L-22R to the west to improve existing intersection geometry between Runway 9R-27L and 4L-22R. Under this option, Runway 9C-27C is extended to 12,000 feet.

Characteristics of Option 4 are the same as those for Option 2 with the following exceptions:

- Existing Runway 9L-27R (future Runway 9R-27L) is shifted westward to permit a perimeter taxiway around the new east end. The parallel taxiway to the south is partially relocated to a centerline separation of 665 feet along the eastern end of the runway and is extended eastward to a set of connecting taxiways beginning approximately 2,575 feet beyond the threshold. These link the south parallel taxiway with the parallel taxiway to Future Runway 9C-27C, also at separation of 665 feet from Runway 9R-27L, to create a perimeter taxiway around Runway 27L. The relocated runway and associated taxiways meet ADG V standards. The perimeter taxiways meet ADG VI standards and are designed at runway-to-taxiway separations that keep taxiing ADG V aircraft clear of TERPS approach surfaces.
- Runway 4L-22R is relocated to the west to improve the existing runway intersection geometry with future Runway 9R-27L and to permit an increase in runway length to 7,875 feet. The relocated runway is 200 feet wide and is served by a 100-foot wide full-length parallel taxiway at a 600-foot separation. Connecting and exit taxiways are provided as appropriate for runway length and expected operating patterns. The runway and associated taxiways meet ADG VI standards.
- Runway 9C-27C is 12,000 feet long, nearly 763 feet longer than in Option 2.
- Similar to Option 2, Option 4 includes the development of Runways 10R-28L and 10C-28C and the extension of existing Runway 9R-27L (future Runway 10L-28R). With the closure of the 13,000-foot Runway 14R-32L, Runway 10L-28R becomes the longest runway at the Airport at 12,000 feet. Its length, however, is 1,000 feet shorter than the existing longest runway, due to the need to protect for operations on the perimeter taxiway in this alternative.

Exhibit V-12 illustrates estimated typical runway operating configurations associated with Option 4 under both VFR and IFR conditions and east and west operating flow patterns.

RWY Name	Approx. Lengths
4L-22R	7875'
4R-22L	8071'
9L-27R	7500'
9C-27C	12000'
9R-27L	7967'
10L-28R	12000'
10C-28C	10800'
10R-28L	7500'



Source: Ricondo & Associates, Inc.; Martinez Corp. Aerial Photography (1996); Department of Aviation Airport Management and Records

Prepared by: Ricondo & Associates, Inc.

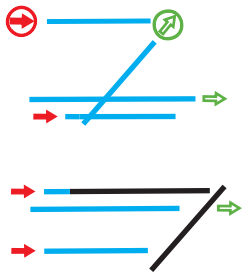
Exhibit V-11

0 3600 ft.

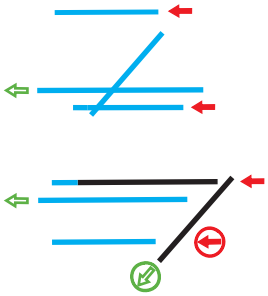
north

Option 4

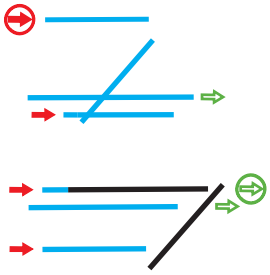
VFR East



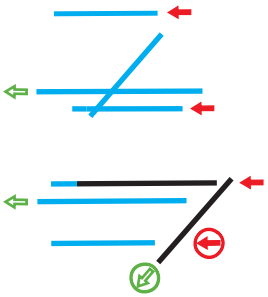
VFR West



IFR East



IFR West



LEGEND

- Existing Runways
- Proposed Runways
- Primary Arrival Runway
- Primary Departure Runway
- Overflow Arrival Runway
- Overflow Departure Runway

Sources: O'Hare Air Traffic Workgroup
Prepared by: Ricondo & Associates, Inc.

Exhibit V-12

0 N.T.S.

north

Operating Configurations Option 4